US005086525A

United States Patent [19]

Christopher

[11] Patent Number: 5,086,525

[45] Date of Patent: Feb. 11, 1992

[54] **MOISTURE-PROOF SPA COVER AND METHOD OF CONSTRUCTION**

[76] Inventor: **Larry D. Christopher**, 1364 S. Kendall Ct., Lakewood, Colo. 80226

[21] Appl. No.: **509,372**

[22] Filed: **Apr. 13, 1990**

[51] **Int. Cl.**[5] **E04H 4/00**; A47K 3/02

[52] **U.S. Cl.** **4/498**; 4/580

[58] **Field of Search** 4/498, 503, 580; 220/215, 339; 156/212, 213, 214, 308.4, 308.2, 221, 475

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,422,192 12/1983 Jacobs 4/498

OTHER PUBLICATIONS

Sta-Warm Industries, Winter 1986, Advertisement in "Canadian Pool & Spa Marketing".

Advertisement in "Spa Trade Journal and Sauna" Starlite Leisure Products Inc., Jul. 1990.

Advertisement in "Aqua" Olympic Spa Covers, Feb. 1989.

Classic Covers, Feb. 1986 Advertisement in "Spa and Sauna".

ATA Industries, Mar. 1982 Advertisement in "Spa and Sauna".

Sentinel Pool Products brochure.

Primary Examiner—Henry J. Recla

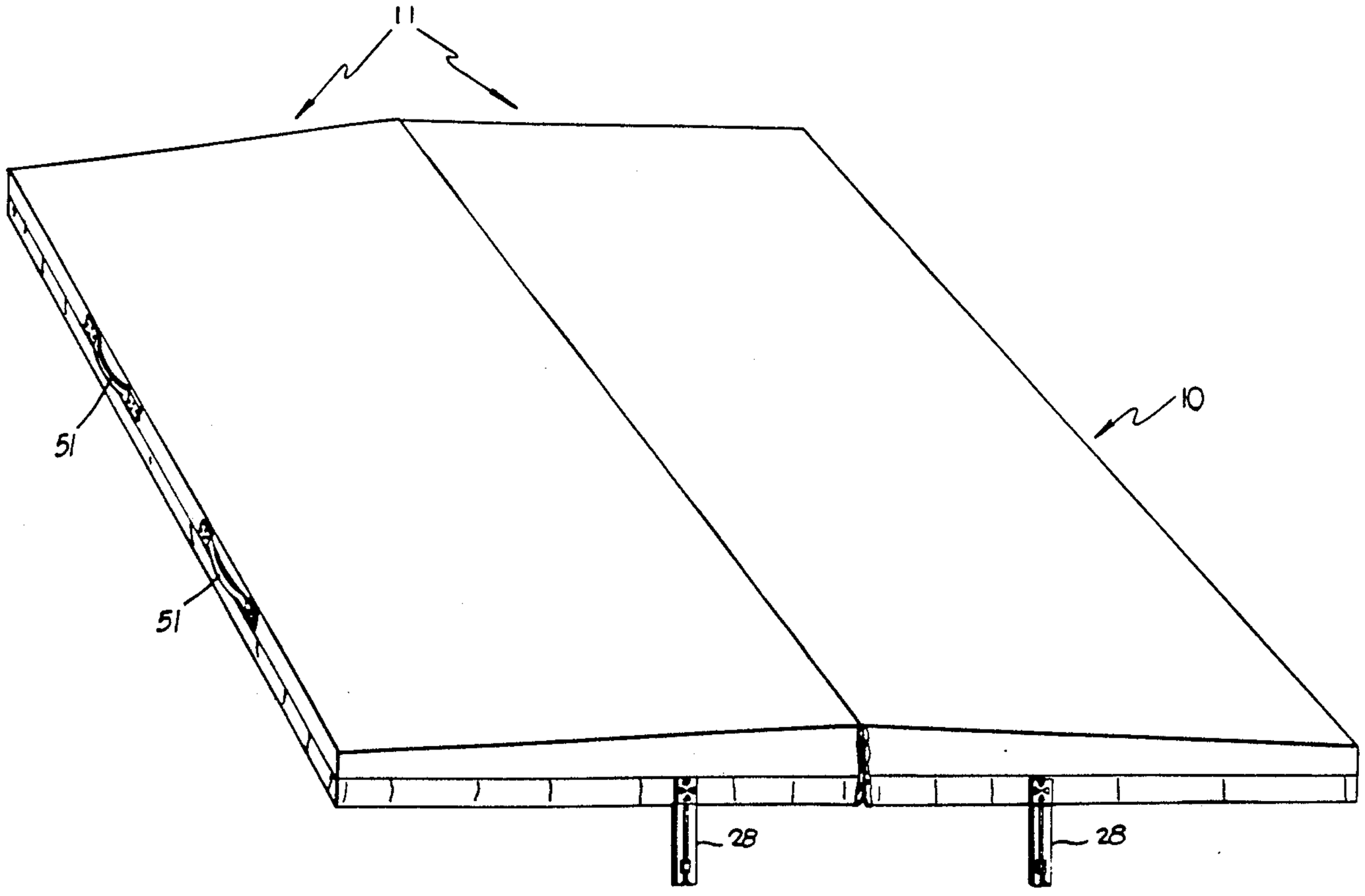
Assistant Examiner—David J. Walczak

Attorney, Agent, or Firm—Beaton & Swanson

[57] **ABSTRACT**

An improved design and method of construction for spa or hot tub covers. The top panel and bottom panel of a first cover are each unitary and are heat sealed together to provide a superior moisture-proof cover. A second cover is constructed in the same manner and the two covers are hingedly attached together with a heat sealed flange integral with the top and bottom panels of each cover.

18 Claims, 7 Drawing Sheets



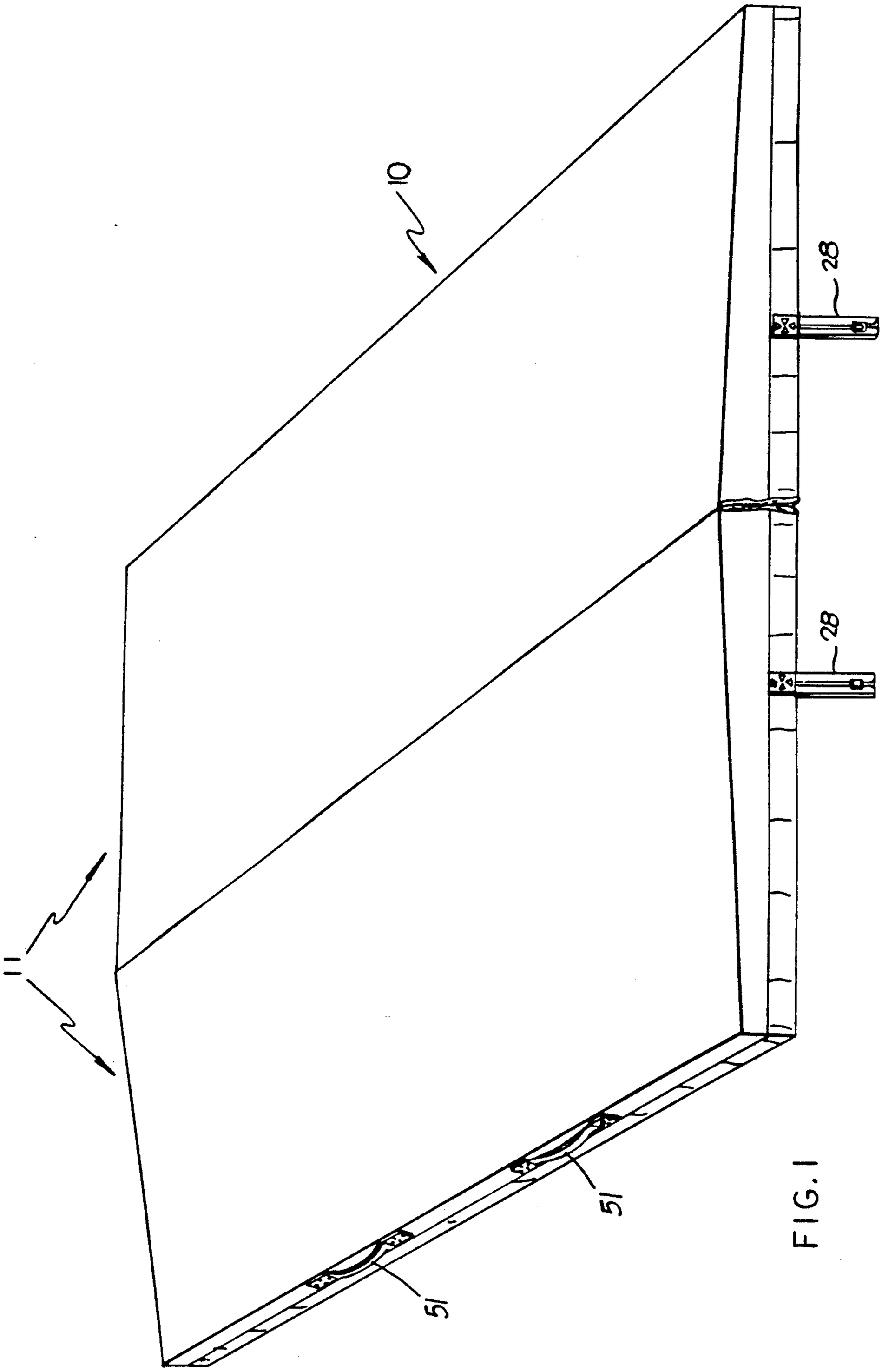


FIG. 1

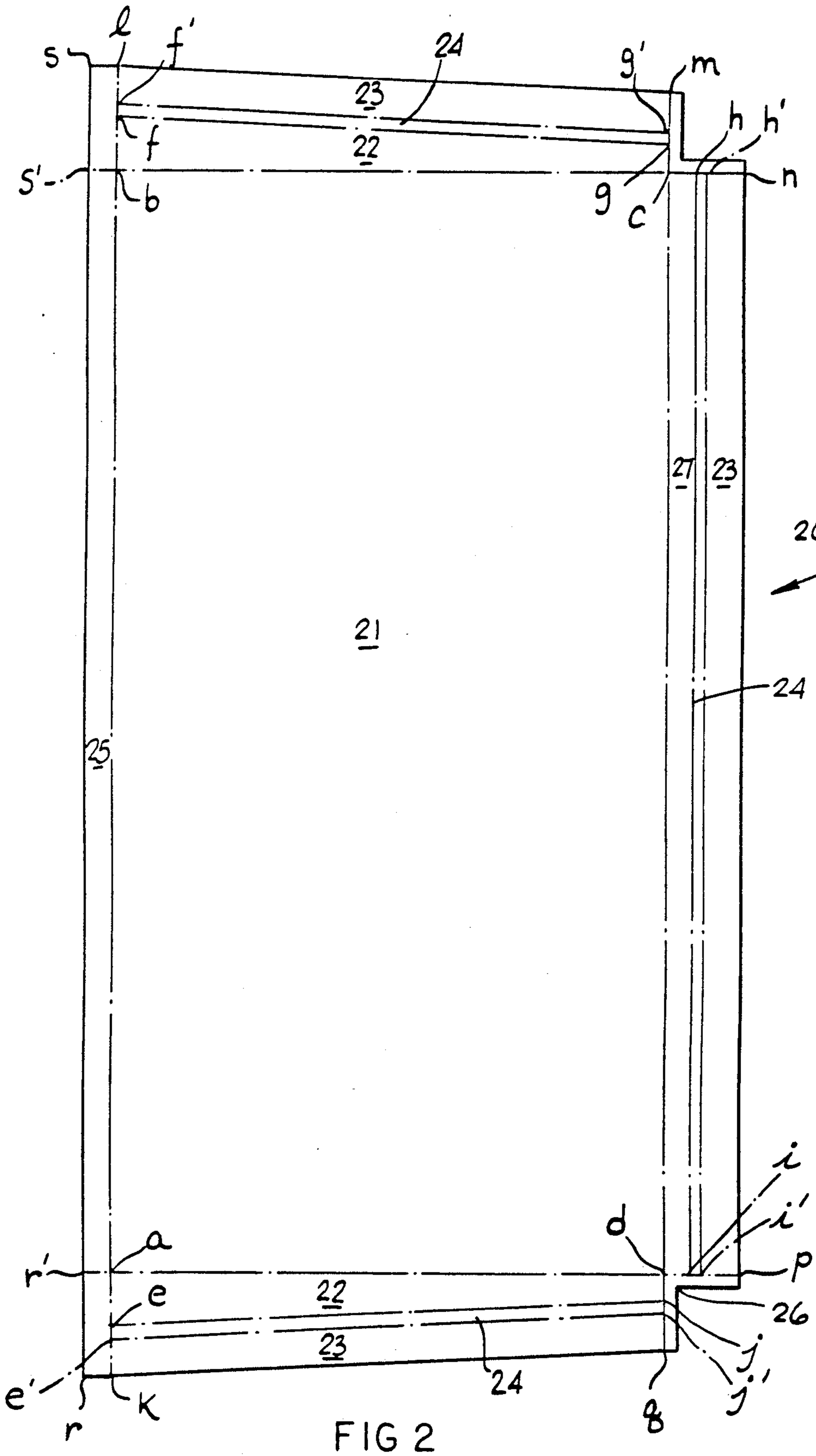

l
f'
24
s
g'
m
23
h
h'
f
22
s'
n
b
g
c
21
27
23
20
25
24
i
i'
d
a
p
r'
e
22
26
23
j
j'
e'
24
r
k
g

FIG 2

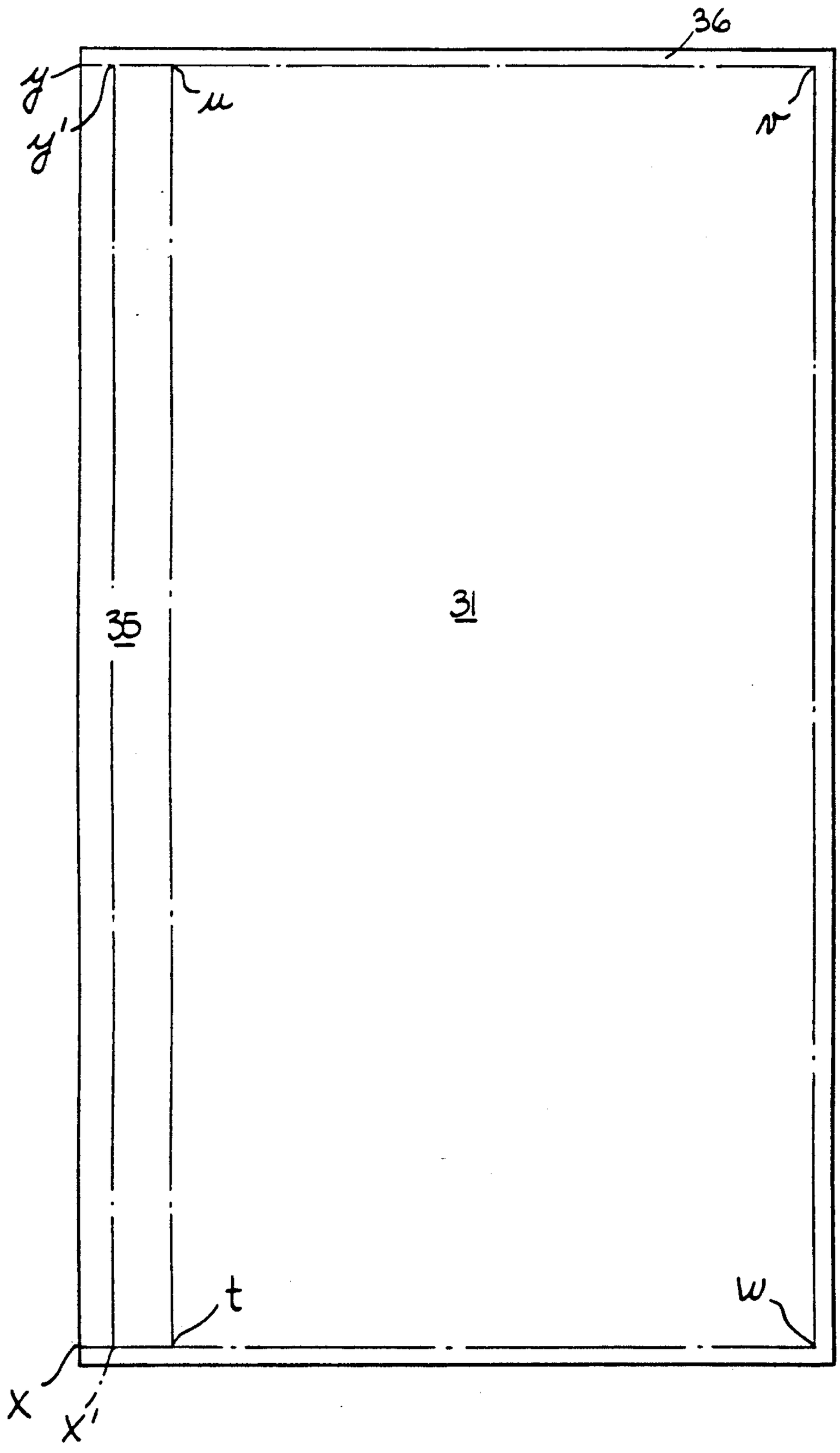


FIG.3

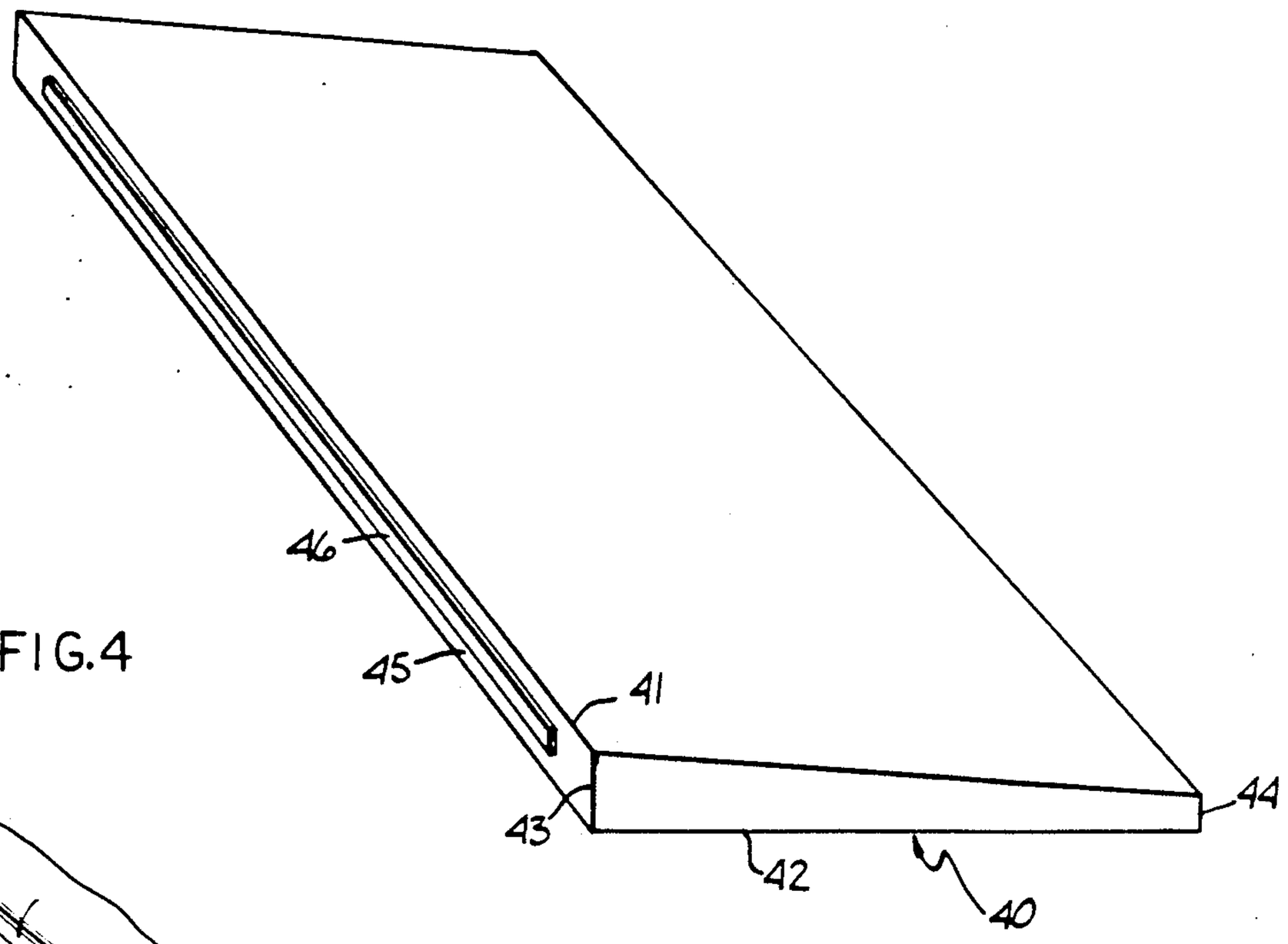


FIG.4

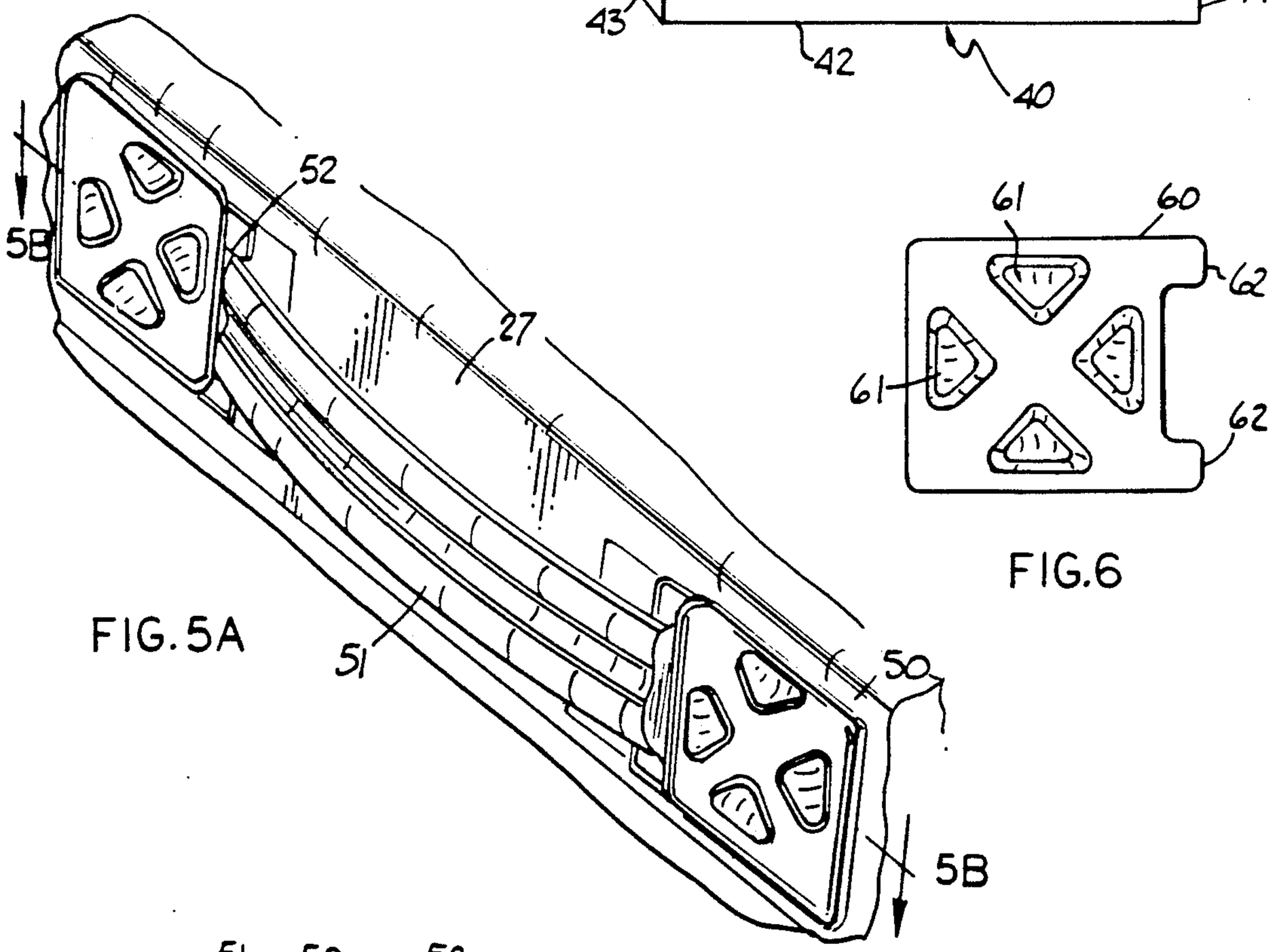


FIG.5A

FIG.6

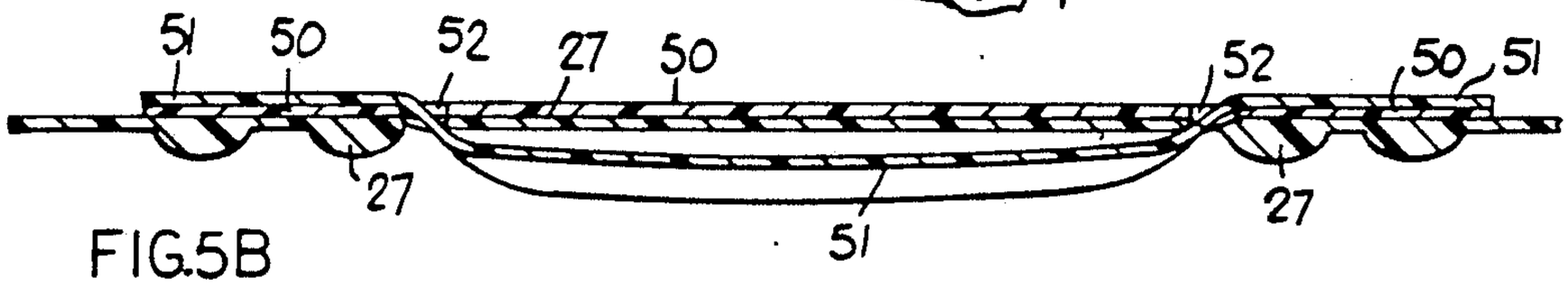


FIG.5B

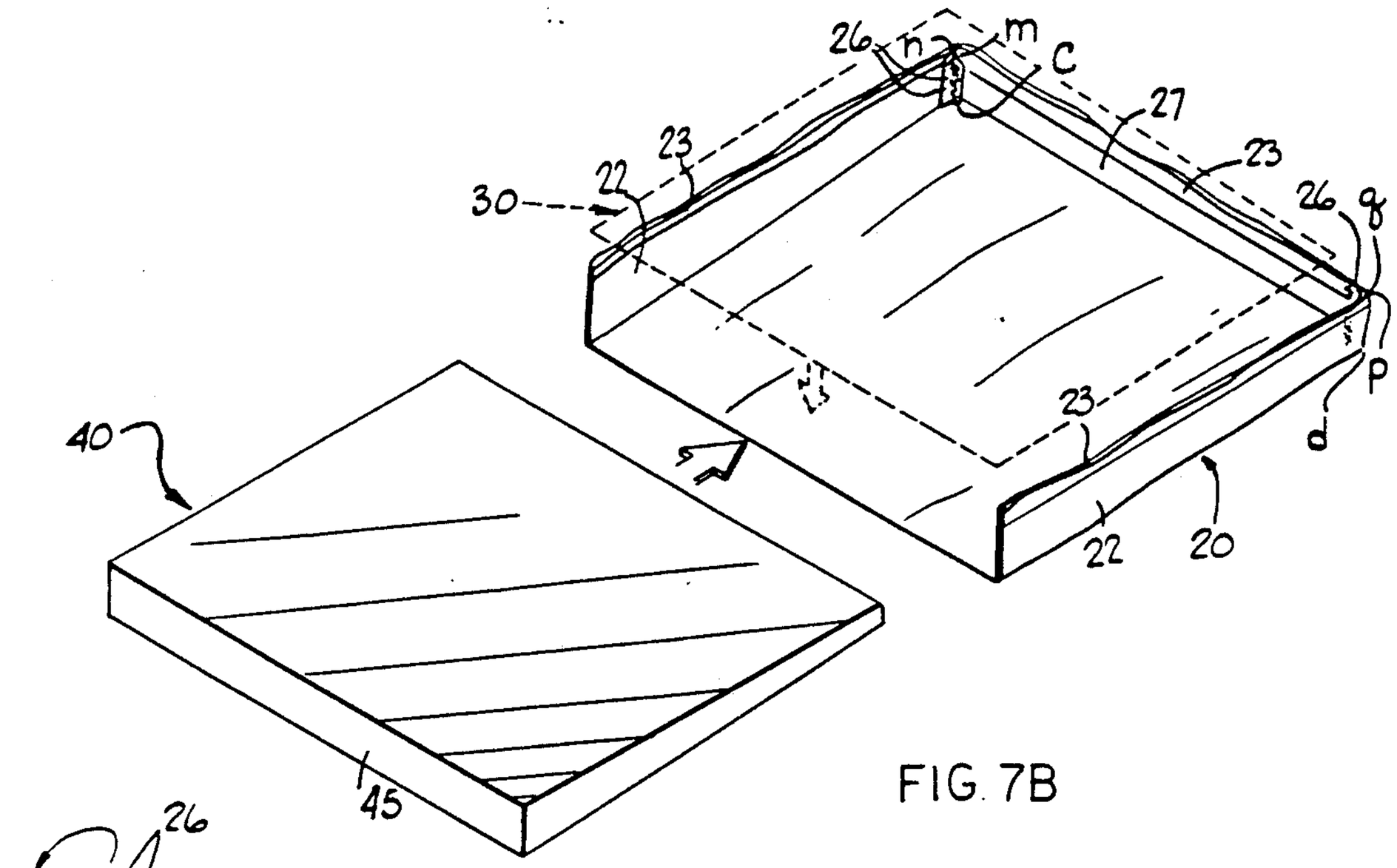


FIG. 7B

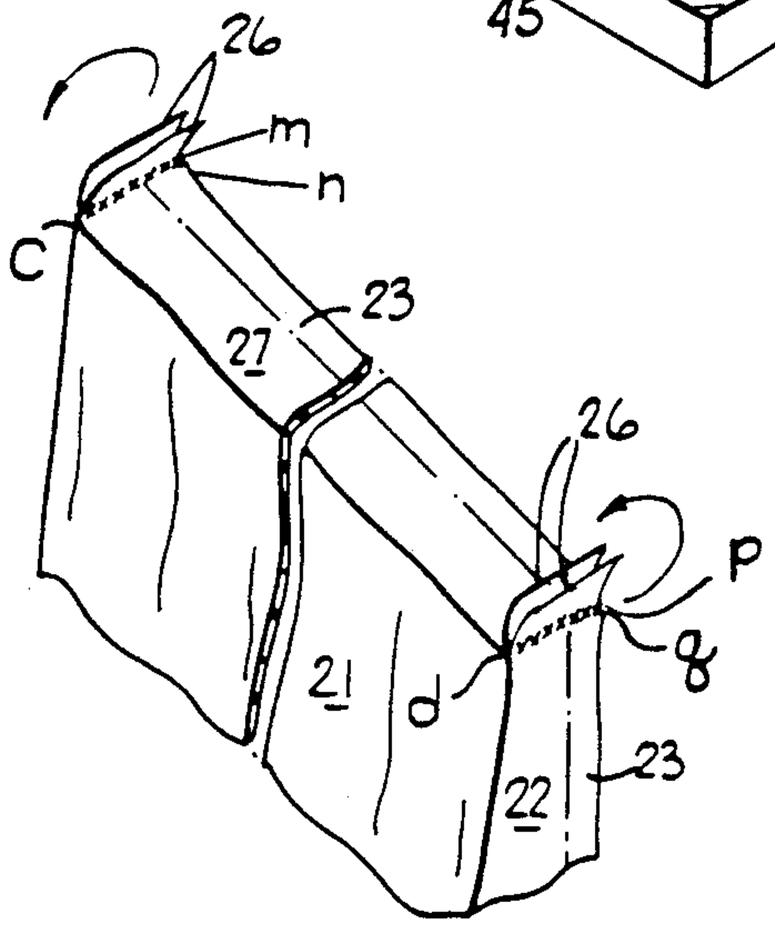


FIG. 7A

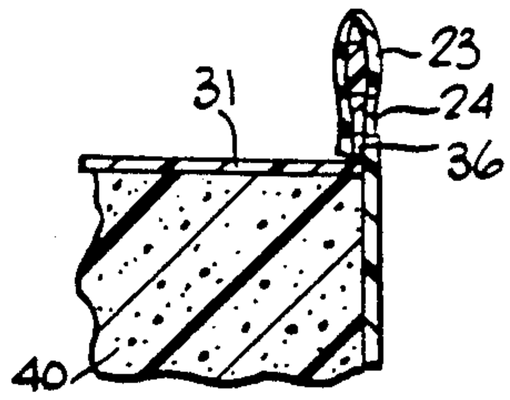


FIG. 8B

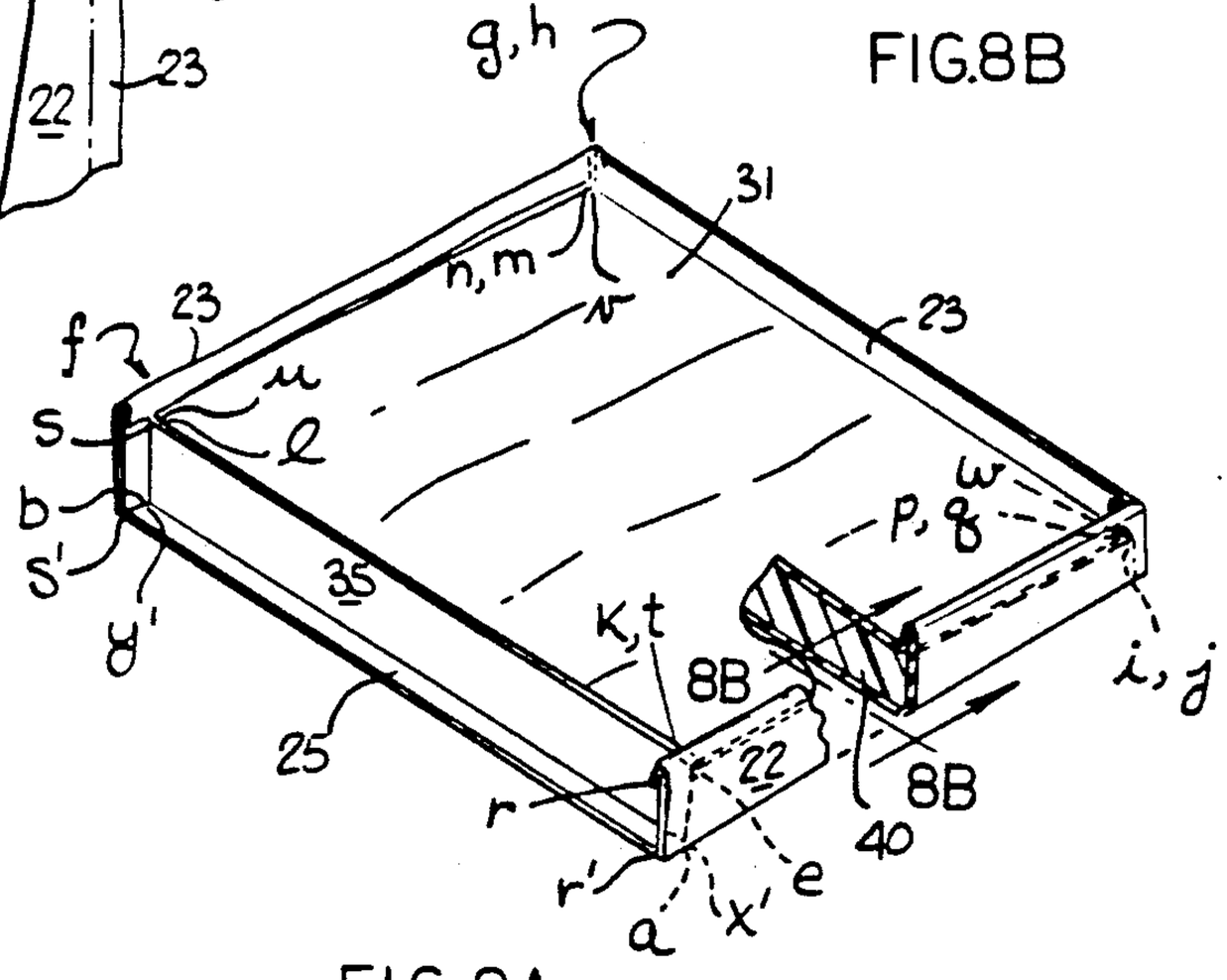


FIG. 8A

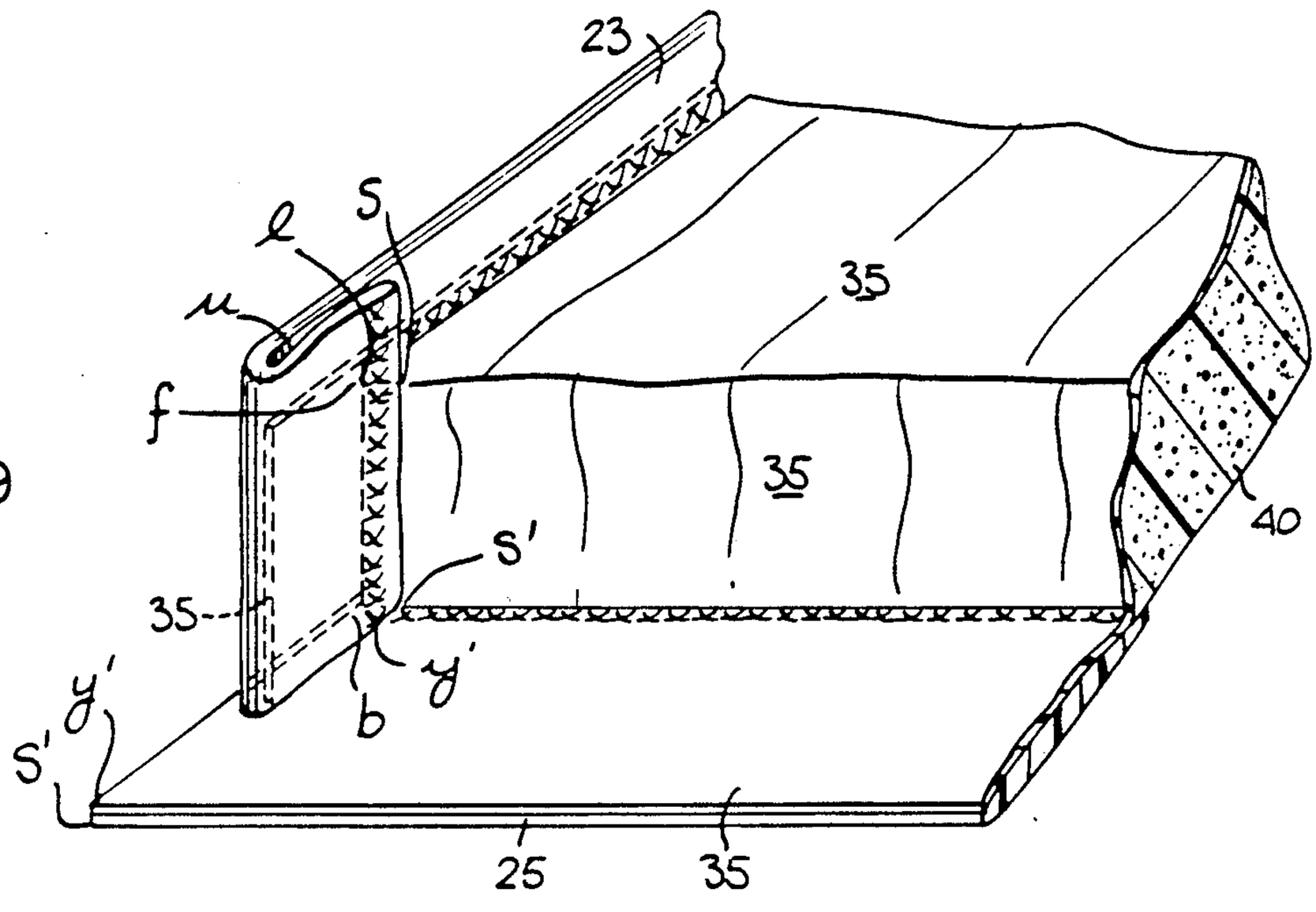

23
S
l
u
f
35
35
S'
35
y'
y'
S'
b
25
35
40

FIG.9

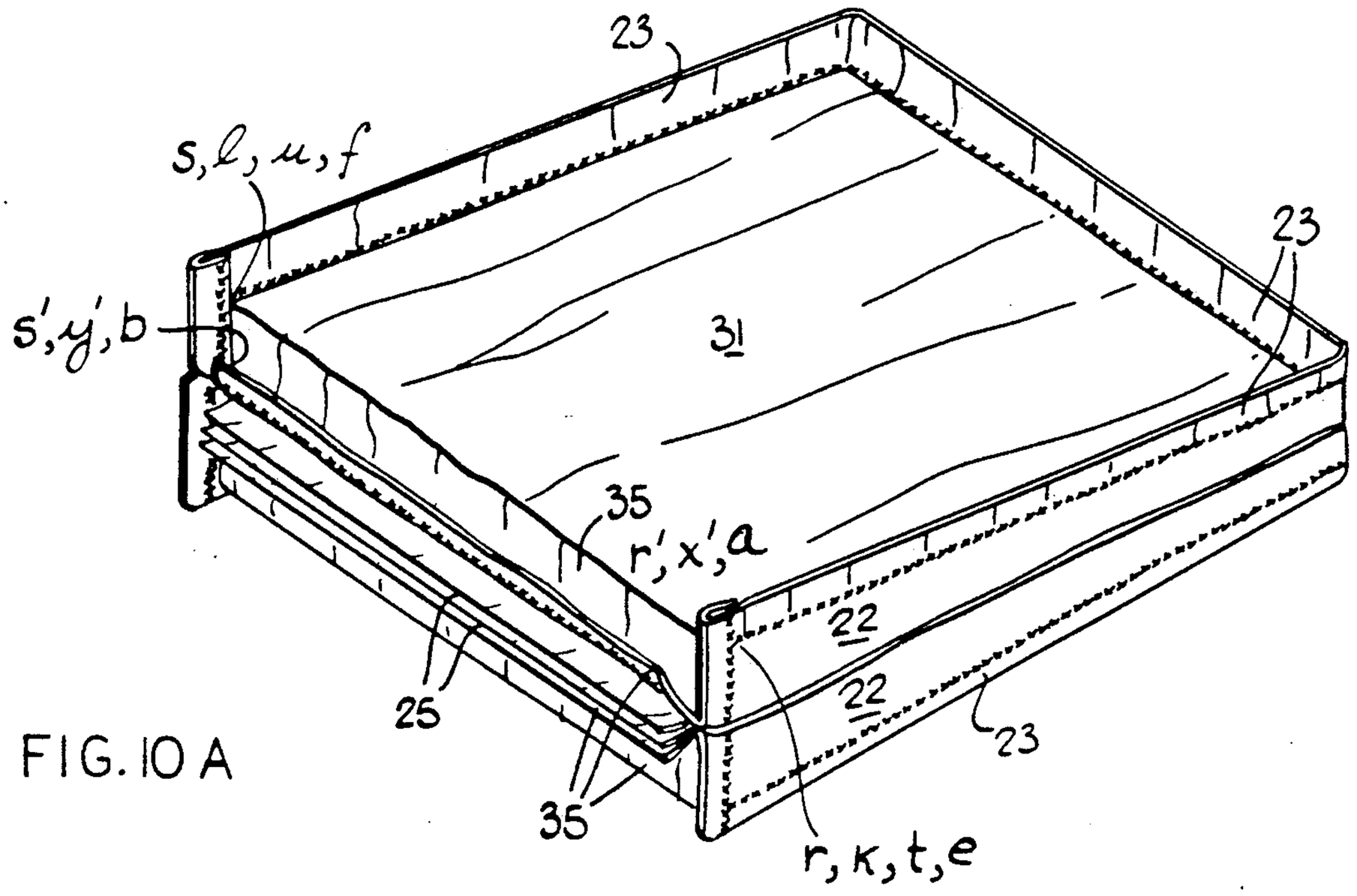

23
s, l, u, f
23
s', y', b
31
35
r', x', a
22
22
23
25
35
r, k, t, e

FIG. 10 A

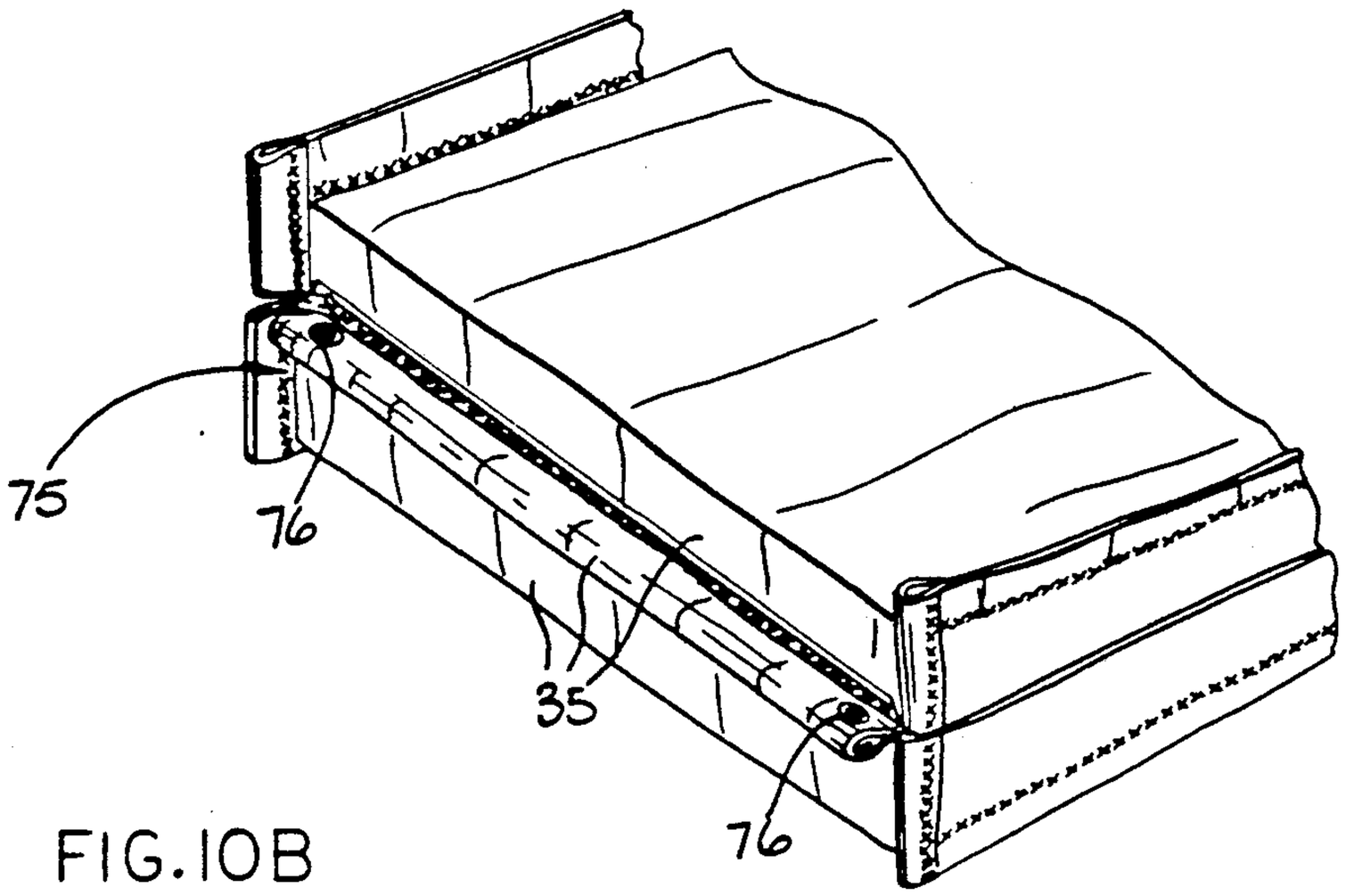


FIG.10B

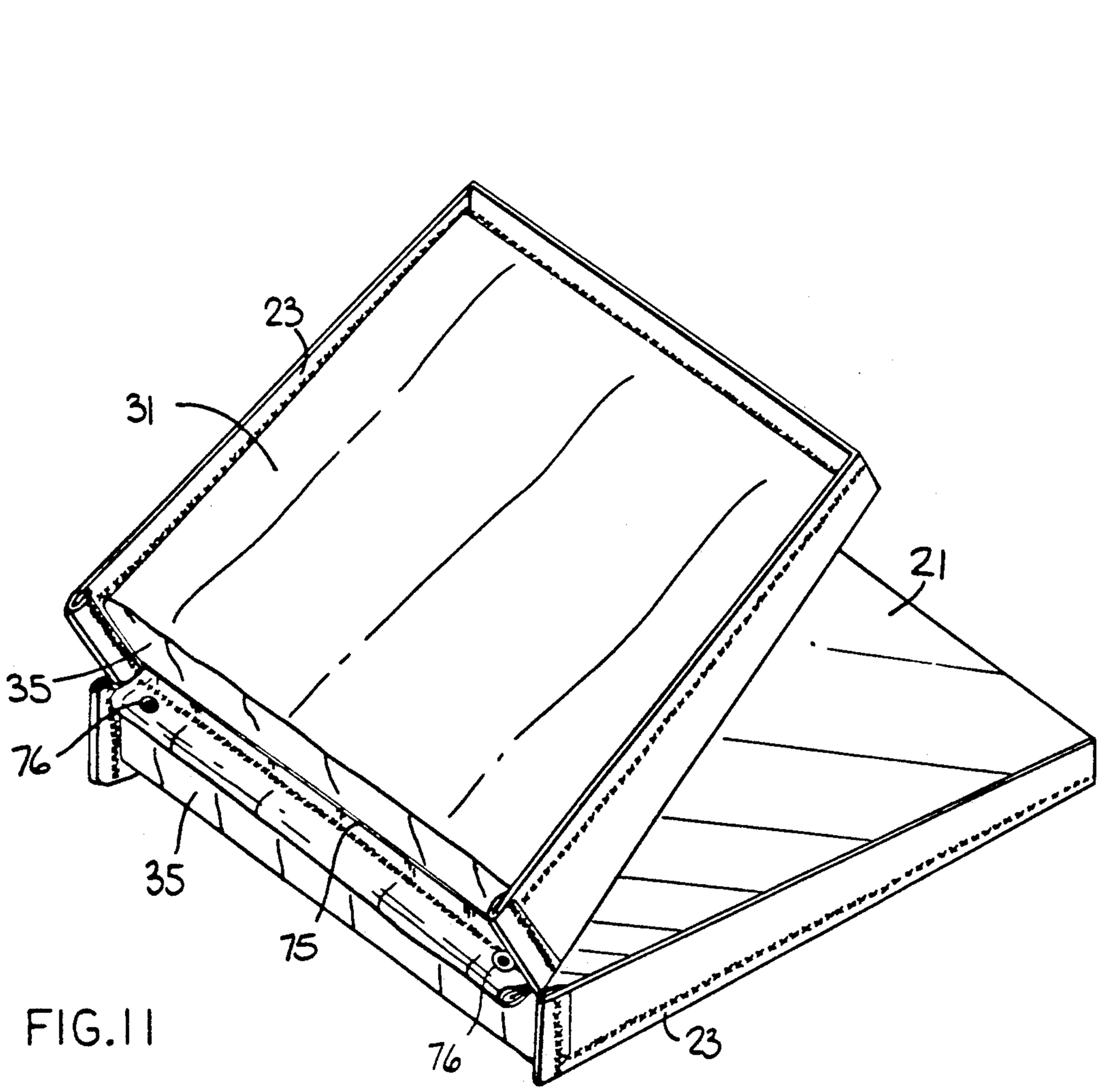


FIG.11

MOISTURE-PROOF SPA COVER AND METHOD OF CONSTRUCTION

FIELD OF THE INVENTION

This invention relates to an improved design and method of construction for spa or hot tub covers. In particular, this invention provides for unitary design of the cover encasement top and heat seal construction to provide a superior moisture-proof cover.

BACKGROUND OF THE INVENTION

The basic design of a cover for a spa or hot tub (collectively referred to in this disclosure as a "spa") is well known in the art. The design essentially comprises a single piece or several pieces of rigid material, typically a thermally insulating material, encased in a water-resistant sheet material. The rigid material is shaped to cover the top opening of a particular design of spa. Handles are attached to the encasing sheet material to aid removal of the cover, and securing tabs are similarly attached to secure the cover onto the top opening of the spa.

A spa cover of this basic design performs several functions. The cover reduces loss of heat from the water in the spa. The cover prevents entry of debris into the spa. The cover prevents accidental injury of small children and others who might fall into the spa. Because spas are often located outside any protective structure, the cover also prevents the entry of natural elements such as rain, snow, sleet and hail into the spa. The present invention performs all these functions.

In typical previous designs at least six separate pieces of sheet material are required to encase the rigid material: top, bottom, side and end gussets, flaps, handles, and tabs. Often the gussets and flaps are produced from scrap material and so may be comprised of a plurality of even smaller pieces of sheet material. In previous designs these pieces of sheet material are sewn together inside out and then turned right side out to form the encasement.

Previous designs of a spa cover encasement formed by a plurality of sheet material pieces sewn together have proved unsatisfactory. When exposed to natural elements over a period of time the sewn seams inevitably allow moisture to penetrate inside the spa cover. This results in the formation of mold and mildew in the spa cover.

Construction of such a spa cover encasement may take an unacceptably long time because of the presence of a plurality of seams which must be sewn. A reduction in the time of construction, a labor intensive activity, will significantly reduce the cost of the completed spa covers.

SUMMARY OF THE INVENTION

The present invention discloses a superior spa cover design and method of construction, which result in a completely moisture-proof spa cover that can be constructed in significantly less time than previous designs. The present invention discloses a unitary spa cover encasement top with fewer seams. The seams are heat sealed, not sewn, eliminating moisture penetration into the spa cover. The reduced number of seams and heat seal method of construction significantly reduce the time required to produce a spa cover.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective of the spa cover constructed according to this invention.

FIG. **2** is a plan view of the top panel of a cover half, showing various sections of the panel before folding and assembly.

FIG. **3** is a plan view of the bottom panel of a cover half, showing various sections of the panel before folding and assembly.

FIG. **4** is a perspective view of the rigid material insert.

FIG. **5***a* shows a perspective view of the attachment of a handle to a side or end portion. FIG. **5***b* is a section view along line **5***b*–**5***b* of FIG. **5***a*.

FIG. **6** is a plan view of the handle and tab die pattern.

FIG. **7***a* is a perspective view of the top panel showing the corner seals, with the corners exaggerated for clarity. FIG. **7***b* is a perspective view of the top panel with the corner seals, the bottom panel and the rigid material insert, showing the general orientation of the elements before construction.

FIG. **8***a* is a perspective view of the top panel and bottom panel showing them sealed together, with the sealed portion exaggerated for clarity and also showing a partial cut-away view of the seal. FIG. **8***b* is a sectional view along line **8***b*—**8***b* of FIG. **8***a*.

FIG. **9** is a perspective view of a cover half after the top panel and bottom panel are completely sealed around the rigid material insert.

FIGS. **10***a* and **10***b* show steps in construction of the hinge portion between the cover halves.

FIG. **11** is a perspective view of the spa cover constructed according to this invention showing the hinge construction.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The spa cover designed and constructed as described in the preferred embodiment is for use on a spa configured with a top opening which is approximately square, with each side of the spa top opening approximately 84 inches long. The 84-inch square spa is one of several common configurations. It will be apparent that this invention may be employed with many other spa configurations.

The spa cover **10**, shown in FIG. **1** and FIG. **11**, essentially is comprised of two cover halves **11** joined along a connecting edge to form a hinge **75**. Each cover half **11** essentially is comprised of a top panel **20**, bottom panel **30**, a rigid material insert **40** placed between the panels, and one or more handles **51** and securing tabs **28**.

The preferred embodiment will first describe the design of the major components of the spa cover **10**. The construction of the major components into spa cover **10** will then be described.

Top panel **20** is shown in FIG. **2**. Top panel **20** is a single piece of sheet material such as expanded vinyl. The preferred embodiment uses expanded vinyl sold by CGPC America Corp., of Cerritos, Calif. under the name "Leisure Time."

Central section **21** of top panel **20** is bounded by the points abcd. In the preferred embodiment, to be used with an 84-inch square spa, length ab and length cd measure 84 inches each; length ad and length bc measure 42 inches each. Side panel sections **22** are bounded by the points bfgc and eadj. End panel section **27** is

bounded by the points dchi. Length bf and length ae measure four inches each; lengths cg, ch, di and dj measure two inches each. When constructed the spa cover **10** will then slope from a height of four inches at hinge **75** to two inches at end panel **27**. The slope improves moisture run off, and hence, moisture repellency.

Skirt sections **23** are bounded by points flmg, hnpi and kejq. Lengths fl, gm, hn, ip, ek and jq measure four inches each. Lengths fg and lm, ih and pn, and ej and kq are parallel. A fold line f'g', h'i', e'j' is marked on each skirt section **23**. Each fold line is 1 inch from and parallel to the inside edge of the corresponding skirt section **23**. Thus, edge fg and fold line f'g' are parallel and lengths ff' and gg' measure one inch each; edge ej and fold line e'j' are parallel and lengths ee' and jj' measure one inch each; edge hi and fold line h'i' are parallel and lengths hh' and ii' measure one inch each. The parallel edges and fold lines define sealing flanges sections **24** within skirt sections **23**. Hinge flange section **25** is bounded by points rslk. Lengths rk and sl measure two inches each. Corner sealing flange sections **26** extend one inch from edges mcn and qdp, respectively.

Bottom panel **30** is shown in FIG. **3**. Bottom panel **30** is a single piece of sheet material such as tear-resistant polyvinylchloride. Central section **31** is bounded by points tuvw. Lengths tu and vw measure 84 inches each; lengths uv and tw measure 42 inches each. Hinge flange section **35** is bounded by points xyut. Lengths xt and yu measure six inches each. Sealing line x'y' is parallel to and measures one inch from edge xy. Sealing flange section **36** extends one inch from edge yvwx.

Rigid material insert **40** is shown in FIG. **4**. Rigid material insert **40** in the preferred embodiment is a single piece of expanded polystyrene. Rigid material insert **40** for each cover half **11** is smaller than the desired dimensions for each half of the finished cover to account for the thickness of the hinge between the cover halves **11**. Edge **41** measures 84 inches; edge **42** measures 41 inches; edge **43** measures four inches; edge **44** measures two inches. A support bar **46**, typically made of metal, is embedded in side **45** for strength.

When incorporated into the spa cover **10**, rigid material insert **40** will be oriented so that side **45** of each insert **40** is in the middle of the cover **10** adjacent hinge **75**. Edges **42** will be adjacent to top cover panel edges ej and fg and the seams between side panels **22** and skirts **23**.

Briefly stated, the spa cover is constructed as follows: the handles are attached to the top panel, the corner flanges in the top panel are sealed, the bottom panel and top panel are sealed together on all edges except the edge where the hinge will be formed, the securing tabs are sealed onto the skirts, the rigid material inserts are placed between the top and bottom panels by inserting them at the open hinge edge, the hinge edge is sealed, and the hinge flanges are sealed together between the cover halves. Each step will now be described in detail.

Handles **51** are attached to top panel **20** at end panel **27**. In the prior art, handles are attached to the spa cover encasement merely by sewing the handles directly onto the outside of the cover encasement. The prior art has two disadvantages. First, because the handles merely are attached to the outside of the cover encasement the exposed handle attachment sections may wear or be caught on sharp objects, severing the thread and causing the handle to come off. Second, the thread in the sewn seams in attachment sections may wick moisture through the seams into the spa cover.

The present invention overcomes these disadvantages. The handle **51** in the present invention is sealed to the sheet material of the top panel **20**, producing a moisture proof attached handle with no exposed handle attachment.

Handles **51** are attached as shown in FIG. **5***a*. In the preferred embodiment, two handles **51** are attached to each end panel **27**. Handles **51** are positioned to be equidistant from the ends and center of end panel **27**.

Heat seal die **60** used for attachment of handle **51** is shown in FIG. **6**. Die **60** contains recesses **61** to allow for expansion of the heated material. Die **60** also has prongs **62** which will perform an overlapping function during handle and tab attachment so as to provide a more complete seal.

As shown in FIG. **5***b*, in preparation of the attachment of a handle **51**, the area of end panel **27** to which handle **51** is to be attached is reinforced with rip stop nylon reinforcement piece **50**. Reinforcement piece **50** is heat sealed to end panel **27** on the inside surface of the cover, with the prongs **62** of the die pointed away from the center of the handle.

After reinforcement piece **50** is heat sealed to the inside of end panel **27**, slit openings **52** are cut into end panel **27** and reinforcement piece **50**. Openings **52** are located between the marks left by prongs **62** of die **60**, so that the reinforcement piece **50** heat seals will be on the handle center side of the openings **52**. The ends of handle **51** are inserted into openings **52**. Die **60** is again used to heat seal end panel **27**, reinforcement piece **50** and the ends of handle **51**, this time with the die placed so that the handle heat seal will be opposite the handle center side of the openings **52**. The die **60** is also turned 180° so that the prongs **62** of the handle heat seal overlap the prongs **62** of the reinforcement piece heat seal. In this fashion, handles **51** are securely attached to end panel **27** in a moisture-proof seal.

The corners of the top cover are next constructed by manipulating corner sealing flanges **26** so that the outside of edges cm and cn, and edges dp and dq are in contact as shown in FIG. **7***a* (with the corners exaggerated for clarity) and in FIG. **7***b* (also showing the general orientation of top panel **20**, bottom panel **30** and rigid material insert **40**). The edges are then heat sealed together, and excess material of corner sealing flanges **26** is trimmed off. By sealing the outside edges together, rather than sealing the inside edges together, the excess material from corner sealing flanges **26** is on the inside of the cover encasement rather than on the outside where it can wear or be caught on sharp objects.

The top panel **20** and bottom panel **30** are then sealed together as shown in FIG. **8***a* to form a cover encasement assembly. Top panel **20** is placed with the inside surface (the surface that will contact the rigid material insert **40**) facing up. Bottom panel **30** is placed on top panel **20**, and the three outer edges of sealing flange section **36** are aligned with top panel edges f'g', h'i' and e'j'. Skirt sections **23** of top panel **20** are folded over sealing flange section **36** of bottom panel **30** so that edge lm is aligned with edge uv, edge np is aligned with edge vw, and edge kq is aligned with edge tw. A heat seal is then applied to the aligned edges. Thus, edges lm, uv and fg are sealed together, in that order looking down on the seal. Similarly, edges np, vw and hi are sealed together, and edges kq, tw and ej are sealed together.

At this stage of construction the edges are sealed with straight dies; therefore the seal terminates short of the corners at points g/h and i/j. The corners are then sealed by the use of corner dies.

Next securing tabs **28** are attached to skirts **23**. The number and placement of tabs **28** will vary depending upon the size and shape of the cover and the climate conditions in which the cover is used. For example, a cover which is unusually large or which is used in unusually windy conditions may require more tabs. In the preferred embodiment one tab **28** is attached to skirt **23** at approximately the midpoint of each side panel **22**.

To attach tab **28** a slit opening is made in the edge of skirt **23** where skirt section **23** was folded over sealing flange section **36**. The opening is just wide enough to allow insertion of tab **28**. Tab **28** is inserted into the opening in skirt **23** until the inserted end contacts the seal between skirt **23** and central section **21** and side panel **22**. Skirt **23** and tab **28** are then sealed together with the same die **60** used to attach handles **51** to end panel **27**.

As shown in FIG. 7*b*, rigid material insert **40** is then inserted into the cover encasement assembly, with end **45** at the opening of the cover encasement assembly.

As shown in FIG. 8*a* and FIG. **9**, bottom panel hinge flange section **35** is then pulled tight and folded down over rigid material end **45**. Hinge flange section **35** is sealed to top panel **20** so that sealing line x'y' on hinge flange section **35** is sealed to edge ab on top panel **20**.

A cut is made in top panel hinge flange section **25** along lines r'a and s'b. Edge ss' is folded over the portion of bottom panel sealing flange section **36** from point u to y' so that points s, l, u and f are aligned. A seal is made at the folded edge ss' along the entire length of the fold, from where points s', y' and b are aligned to where points s, l, u and f are aligned and through flap section **23**, as shown in FIG. **9**. A similar fold-and-seal process is applied to the other end of flange sections **25** and **35**. These seals produce a moisture-proof seal entirely around rigid material insert **40**.

Each cover half **11** is constructed by this method. The completed cover halves **11** are placed one on top of the other so that their top panel center sections **21** are in contact as shown in FIG. **10***a*. The sheet material extending from hinge flange sections **25** and **35** from each cover half **11** is heat sealed along top panel edge ab and bottom panel sealing line x'y'. This seal produces a hinge flange between the cover halves **11**.

It has been discovered, however, that a second seal strengthens the hinge. Thus, sheet material of hinge flange sections **25** and **35** extending from the first hinge seal along edge ab and sealing line x'y' is folded over onto itself so that edges r's' and xy are aligned with the first hinge seal along edge ab and sealing line x'y'. As shown in FIG. **10***b*, edges r's' and xy are then sealed to the first hinge seal, so that eight thicknesses of material are sealed together along edges xy, r's' and ab and sealing line x'y'. As additional reinforcement for hinge **75**, a rivet or grommet **76** is placed in hinge **75** at each end. This seal-fold-seal sequences produces hinge **75** between cover halves **11** as shown in FIG. **10***b* and FIG. **11**.

What is claimed is:

1. An apparatus to protect a spa, comprising a first cover with:

a one-piece insulating insert having a top surface and bottom surface;

a substantially unitary flexible top panel sheet made of a durable weather resistant and water proof material and having an inner side surface, an outer side surface and a periphery, said top panel covering said insert, with said top panel inner side surface in direct contact with said insert top surface and said top panel outer side surface being exposed;

a substantially unitary flexible bottom panel sheet made of a durable weather resistant and water proof material and having an inner side surface, an outer side surface and a periphery, said bottom panel covering said insert, with said bottom panel inner side surface in direct contact with said insert bottom surface and said bottom panel outer side surface being exposed, and substantially all of said bottom panel periphery being attached to substantially all of said top panel periphery so that said insert is protected from moisture.

2. The apparatus of claim **1**, wherein said top panel is cut from a single sheet of material and said bottom panel is cut from a single sheet of material.

3. The apparatus of claim **2**, wherein:

said insert has sides;

said top panel includes at least one integral side panel to cover said insert sides; and

at least a portion of said top panel periphery is in said integral side panels, so that the seal between said top panel and bottom panel includes a seal between said side panel and said bottom panel.

4. The apparatus of claim **3**, wherein said integral side panel and said bottom panel include flanges, and said side panel flange is folded to cover both sides of said bottom panel flange at said seal, and said seal is through said bottom panel flange and the folded side panel flange.

5. The apparatus of claim **4**, wherein said bottom panel flange is folded approximately 90° so that it folds over the outside edge of said spa, and said side panel flange folds over both sides of said bottom panel flange and is sealed thereto to form a protective skirt over the edge of said spa.

6. The apparatus of claim **5**, wherein the periphery of said side panels include sealing flanges to seal to an adjacent side panel, and wherein said sealing flanges are sealed together with their outer surfaces in contact with one another so that the edges of said flanges are in contact with the insert.

7. The apparatus of claim **6**, further comprising a second cover substantially the same as said first cover and attached to said first cover.

8. The apparatus of claim **7**, wherein said first and second covers are attached along attaching sides with a hinge extending the length of said sides.

9. The apparatus of claim **8**, wherein said hinge is a seal between the periphery of at least one of said top panel and bottom panel of said first cover, and at least one of said top panel and bottom panel of said second cover.

10. The apparatus of claim **9**, wherein;

said insert of each of said first cover and second cover has a side adjacent said hinge;

said bottom panel of each of said first cover and second cover includes an integral side panel to cover said insert sides adjacent said hinge;

at least a portion of the periphery of said bottom panels is in said side panel covering said insert sides adjacent said hinge of each of said first cover and second cover, so that the seal between said top

panel and said bottom panel of each of said first cover and second cover includes a seal between said side panel covering said insert sides adjacent said hinge and said top panel of each of said first cover and second cover;

said sealing hinge is at the seal between said side panels covering said insert sides adjacent said hinge and said top panels.

11. The apparatus of claim **10**, wherein said side panels covering said insert sides adjacent said hinge, and said top panels, include a hinge sealing flange extending from said hinge seal, and said hinge sealing flange is folded parallel to said hinge seal and the hinge sealing flange edge is sealed to said hinge seal to further strengthen said hinge seal.

12. The apparatus of claim **11**, wherein a plurality of substantially parallel pairs of slit openings are in said side panels covering said insert sides, each end of a handle is inserted into each of said openings, and said handle ends are sealed to said side panels.

13. A method of manufacturing an apparatus to protect a spa, comprising constructing a first cover by:

forming a one-piece insulating insert having a top surface and a bottom surface;

cutting out a substantially unitary flexible top panel sheet made of a durable weather resistant and water proof material, with an inner side surface, an outer side surface and a periphery;

cutting out a substantially unitary bottom panel sheet made of a durable weather resistant and water proof material, with an inner side surface, an outer side surface and a periphery;

attaching a portion of said top panel periphery to said bottom panel periphery to form an envelope with the outer sides of said top panel and bottom panel on the outside of the envelope;

inserting said insert into said envelope;

attaching substantially all of the unattached periphery of said top panel to substantially all of the unattached periphery of said bottom panel so that the insert is protected from moisture;

constructing a second cover substantially the same as said first cover;

hingedly attaching said first cover to said second cover by attaching a flange of a panel sheet of the first cover to a panel sheet of the second cover.

14. The method of claim **13**, in which said insert has sides and said top panel includes a plurality of side panels integral with said top panel to cover said insert sides and each side panel that is adjacent to another side panel includes a sealing flange on the side panel adjacent edge, further comprising sealing together said side panel sealing flanges at corners of the insert with their outer sides in contact so that the flange edges are in contact with the insert corner.

15. The method of claim **14**, in which said side panel and said bottom panel include flanges, further comprising folding said side panel flange cover to cover both sides of said bottom panel flange and sealing through said bottom panel flange and said folded side panel flange.

16. The method of claim **15**, in which said hinged attachment is along attaching sides of said first cover and second cover, said inserts have a side adjacent said hinge, said bottom panels include an integral side panel to cover said insert sides adjacent said hinge, at least a portion of the periphery of said bottom panels is in said side panels to cover said insert sides adjacent said hinge so that sealing said top panels and said bottom panels together includes sealing said top panels together and includes sealing said top panels to said side panels to cover said insert sides adjacent said hinge; further comprising sealing said first cover and said second cover together at said seal between said top panels and said side panels to cover said insert sides adjacent said hinge.

17. The method of claim **16**, in which said side panels covering said insert sides adjacent said hinge and said top panels include a hinge sealing flange extending from said hinge seal, further comprising folding said hinge sealing flange parallel to said hinge seal and sealing the hinge sealing flange to said hinge seal to further strengthen said hinge seal.

18. The method of claim **17**, further comprising making a plurality of substantially parallel pairs of slit openings in said side panels covering said insert sides, inserting each end of a handle into each of said openings and sealing said handle ends to said side panels.

* * * * *